

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
18 August 2005 (18.08.2005)

PCT

(10) International Publication Number
WO 2005/075366 A1

(51) International Patent Classification⁷: **C02F 3/30**,
11/04, A01K 63/04

(21) International Application Number:
PCT/US2005/002745

(22) International Filing Date: 31 January 2005 (31.01.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/540,566 30 January 2004 (30.01.2004) US

(71) Applicant (for all designated States except US): **UNIVERSITY OF MARYLAND BIOTECHNOLOGY INSTITUTE** [US/US]; 701 E. Pratt Street, Suite 200, Baltimore, MD 21202 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **SCHREIER, Harold, J.** [US/US]; 2400 Sugarcone Road, Baltimore, MD 21209 (US). **TAL, Yossi** [IL/US]; 6719 Bonnie Ridge Dr.#101, Baltimore, MD 21209 (US).

(74) Agents: **FUIERER, Marianne et al.**; P.O. Box 14329, Research Triangle Park, NC 27709 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

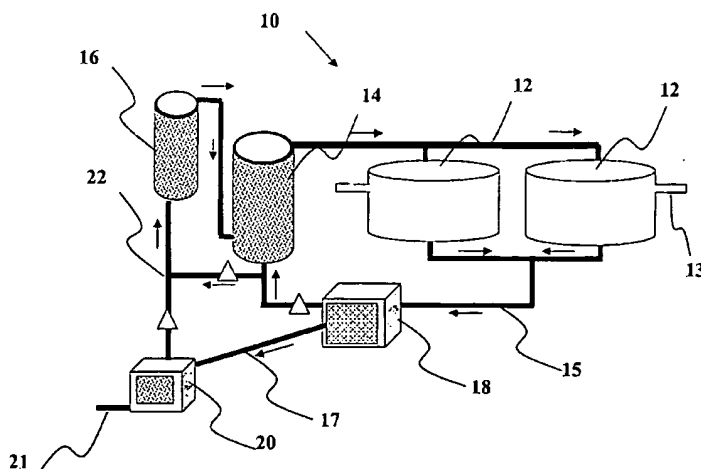
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **DISSIMILATORY SULFATE REDUCTION AS A PROCESS TO PROMOTE DENITRIFICATION IN MARINE RECIRCULATING AQUACULTURE SYSTEMS**



(57) Abstract: The present invention relates to a novel approach for nitrate removal from a marine recirculating system (10) wherein high concentrations of sulfate found in seawater is used in combination with sludge (20) collected from fish growing tanks (12) to promote dissimilatory sulfate reduction to hydrogen sulfide. The sulfide is used as an electron source to promote autotrophic denitrification in an up-flow fixed bed bioreactor (16), followed by nitrification in a nitrification unit (14). By utilizing the symbiotic relationship between the sulfate-reducing and sulfide-oxidizing bacterial community, nitrate accumulation is controlled in the recirculating water of the system thereby reducing water exchange in the marine recirculating system.

WO 2005/075366 A1